Claims

[c1] 1.An illumination device for a scanning microscope comprises:
-an illumination source for generating a laser beam;
-a switchable beam deflection device which directs, in a first switching state, the laser beam along a first beam path, and in a second switching state, along an alternative beam path; and
-a device for frequency conversion of the laser beam is arranged in the beam path of the alternative beam path.

[c2] 2.The device as defined in Claim 1, wherein the switchable beam deflection device comprises a polarization beam splitter in combination with an electrooptical modulator (EOM).

[c3] 3.The device as defined in Claim 1, wherein the device for frequency conversion of the laser beam comprises a waveguide, in particular a waveguide having multiple waveguide tracks.

[c4] 4.The device as defined in Claim 1, wherein the device for frequency conversion of the laser beam is suitable for generating white light.

[c5] 5.The device as defined in Claim 4, wherein the device for frequency conversion of the laser beam comprises a filter device for selecting out a wavelength band.

[c6] 6.The device as defined in Claim 1, wherein the device for frequency conversion of the laser beam comprises a second laser, an optically microstructured material, an OPO, or a device for frequency multiplication.

[c7] 7.The device as defined in Claim 1, wherein the switchable beam deflection device is suitable for directing the laser beam either substantially entirely along the first beam path or substantially entirely along the alternative beam path.

[c8] 8.An illumination device for a scanning microscope comprises:
-an illumination source for generating a laser beam;
-a plurality of switchable beam deflection devices, wherein each of which directs, in a first switching state, the laser beam along a first beam path, and in a second switching state, along an alternative beam path and the plurality of

switchable beam deflection devices and multiple alternative beam paths are provided in parallel with one another; and
-a device for frequency conversion of the laser beam is arranged each beam path of the alternative beam path.

[c9] 9.The device as defined in Claim 8, wherein each switchable beam deflection device is suitable for directing the laser beam either substantially entirely along the first beam path or substantially entirely along the alternative beam path.

[c10] 10.The device as defined in Claim 9, wherein each switchable beam deflection device comprises a polarization beam splitter in combination with an electrooptical modulator (EOM).

[c11] 11.The device as defined in Claim 8, wherein the device for frequency conversion of the laser beam comprises a waveguide, in particular a waveguide having multiple waveguide tracks.

[c12] 12.The device as defined in Claim 8, wherein the device for frequency conversion of the laser beam is suitable for generating white light.

[c13] 13.The device as defined in Claim 12, wherein the device for frequency conversion of the laser beam comprises a filter device for selecting out a wavelength band.

[c14] 14.A scanning microscope comprises:
-a two photon port and a one-photon port;
-an illumination source for generating a laser beam;
-at least one switchable beam deflection device which directs, in a first switching state, the laser beam along a first beam path to the two photon port, and in a second switching state, along an alternative beam path (54) to the one-photon port; and
-a device for frequency conversion of the laser beam is arranged in the beam path of the alternative beam path.

[c15] 15.The scanning microscope as defined in Claim 14, wherein the switchable beam deflection device comprises a polarization beam splitter in combination

with an electrooptical modulator (EOM).

[c16] 16.The scanning microscope as defined in Claim 14, wherein the device for frequency conversion of the laser beam comprises a waveguide, in particular a waveguide having multiple waveguide tracks.

[c17] 17.The scanning microscope as defined in Claim 14, wherein the device for frequency conversion of the laser beam is suitable for generating white light.

[c18] 18.The scanning microscope as defined in Claim 17, wherein the device for frequency conversion of the laser beam comprises a filter device for selecting out a wavelength band.

[c19] 19.The scanning microscope as defined in Claim 14, wherein the device for frequency conversion of the laser beam comprises a second laser, an optically microstructured material, an OPO, or a device for frequency multiplication.

[c20] 20.A method for illumination of a specimen in a scanning microscope wherein the scanning microscope has a two photon port and a one-photon port, comprising the steps:
-providing a laser which defines an illumination source for the specimen;
-directing the laser beam is directed onto a switchable beam deflection device;
-directing the laser beam from the switchable beam deflection device in substantially unattenuated fashion along a first beam path to the two photon port or in substantially unattenuated fashion along an alternative beam path to a one-photon port;
-modifying the laser beam, prior to the one-photon port, along the alternative beam path with respect to its frequency; and
-passing laser beam onto the specimen.

[c21] 21.The method as defined in Claim 20, wherein the switchable beam deflection device is activated so that in the context of line-by-line illumination of the specimen, a line-by-line switchover between the first beam path and the alternative beam path is accomplished.

[c22] 22.The method as defined in Claim 20, wherein an optical fiber is used for

modifying the frequency of the laser light 1n the alternative beam path.

[c23] 23.The method as defined in Claim 22, wherein the laser light on the alternative beam path is directed into a plurality of optical fibers.

[c24] 24.The method as defined in Claim 20, wherein the frequency modification is performed in such a way that white light results.

[c25] 25.The method as defined in Claim 20, wherein the specimen comprises regions of interest (ROIs), and the switchable beam deflection device is controlled in such a way that illumination is accomplished within the ROIs with the light beam from the two-photo port , and outside the ROIs with the light beam from the one-photon port.